(1)

January 5, 1961

Dr. Hans Freudenthal
Professor of Mathematics
University of Utrecht
Holland

Dear Professor Freudenthal:

I have been reading your book "Lincos" with deep interest. I suspect that the material problem of communication with another mathematical species was less weighty in your own mind than the abstract analysis of language which it suggested but at both levels this is plainly an interesting and valuable contribution. Your work should certainly form a substantial basis for a material project and if nothing else, it would be fascinating to test it from a psychological as well as a logical standpoint. In fact, I am moved to ask you whether you have attempted to test your programs on unbiased human subjects. An alternative test of the system, if there is any point in thinking of one, is to design a machine that would be capable of furnishing the key from your code into a natural language, given a specific input of typical transmissions. This would also introduce the interesting topic of the recognition and discounting of errors in the transmissions or their reception. Such errors are bound to occur in any real system and on the principle that p . . p q.

From the standpoint of my own interest, I would have been interested in a more elaborate discussion of section 1.04.1, the Introduction of Variables. From the abbreviated program as presented, it would be difficult to distinguish a as another algorithm for a specific number. Indeed, in this section of the development it might be only the absence of a from expressions of the form 100 > 10 that would hint that this is indeed a variable. In a brief excursion into this, I found it difficult to program a context for variable independently of one for implication although this might be tacit in such a sequence as

1 + a = 2
a = 1

1 + a = 3
a = 2

1 + a = 4
a = 3

1 + a = b
a = b - 1

Here the sequence between related propositions takes the place of formal equivalence and there might be nothing lost in introducing this connective explicitly at this point.

There is an interesting discussion of some aspects of the problems of "convergent expectation" with some reference to the problem of cosmic communication. It may not by obvious necessity have come to your attention: The Strategy of Conflict, by Schelling, 1960, Harvard University Press.

Yours sincerely,

Joshua Lederberg
Professor of Genetics

Enc. 87